

Claims

1. An X-ray detector comprising:

(1) an X-ray sensitive module having a plurality of X-ray detecting elements having a scintillator converting an X-ray to a light and transparent means optically connected to a light output surface of said scintillator transmitting an output light from said scintillator located integrally in a two-dimensional manner via optical reflecting means in a first and a second directions;

(2) a photo-electric module in which photo-electric means located in a two-dimensional manner corresponding to said transparent means of said X-ray detecting elements converting an output light outputted from said scintillator via said transparent means to an electric signal, a first data line reading out said electric signal, a first addressing line addressing said photo-electric means reading out said electric signal, and electrode pads forming part of said first data line or/and said first addressing line are formed, a light output surface of said transparent means is optically connected to said photo-electric means, the area of said photo-electric means positioned on the edge in said first-direction is formed to be smaller than that of said photo-electric means positioned in other positions, said electrode pads are formed near an end surface on which said transparent means is not mounted, and a plurality of said X-ray sensitive

modules are mounted to be adjacent to each other in said first or said second direction;

(3) a distribution module in which a second data line connected to said first data line reading out said electric signal and a second addressing line connected to said first addressing line addressing said photo-electric means reading out said electric signal are formed, and a plurality of said photo-electric modules are mounted; and

(4) module wiring means electrically connecting said electrode pads of said photo-electric modules adjacent to each other, or/and said electrode pad and said second data line, or/and said electrode pad and said second addressing line.

2. The X-ray detector according to claim 1, wherein said transparent means is made of a resin layer which has a thickness smaller than that of said scintillator, has optical transmittance higher than that of said scintillator and is stable to an X-ray, and has a shape in which an angle θ of a normal vector at an arbitrary point of a surface except for a light input surface from said scintillator and an output surface of said resin layer and a normal vector of said input surface or said output surface is $45^\circ \leq \theta < 90^\circ$.

3. The X-ray detector according to claim 2, wherein said resin layer is made of an epoxy resin layer.

4. An X-ray detector comprising:

(1) an X-ray sensitive module having a plurality of X-ray detecting elements having a scintillator converting an X-ray to a light and transparent means optically connected to an output surface of said scintillator transmitting an output light from said scintillator located integrally in a two-dimensional manner via optical reflecting means in a first and a second directions, said transparent means positioned on the edge in said first direction having a cutaway part in part thereof;

(2) a photo-electric module in which photo-electric means located in a two-dimensional manner corresponding to said transparent means of said X-ray detecting elements converting an output light outputted from said scintillator via said transparent means to an electric signal, a first data line reading out said electric signal, a first addressing line addressing said photo-electric means reading out said electric signal, and electrode pads forming part of said first data line or/and said first addressing line are formed, a light output surface of said transparent means is optically connected to said photo-electric means, the area of said photo-electric means positioned on the edge in said first direction is formed to be smaller than that of said photo-electric means positioned in other positions, said electrode pads are formed near an end surface on which said transparent means is not mounted, and a plurality of said X-ray sensitive

modules are mounted to be adjacent to each other in said first or said second direction;

(3) a distribution module in which a second data line connected to said first data line reading out said electric signal and a second addressing line connected to said first addressing line addressing said photo-electric means reading out said electric signal are formed, and a plurality of said photo-electric modules are mounted; and

(4) module wiring means electrically connecting said electrode pads of said photo-electric modules adjacent to each other, or/and said electrode pad and said second data line, or/and said electrode pad and said second addressing line.

5. An X-ray CT apparatus comprising:
an X-ray tube generating an X-ray;
a plurality of X-ray detectors according to any one of claims 1 to 4 located in an arc in said second direction opposite said first X-ray tube;

a detector control circuit producing a control signal for addressing said photo-electric means reading out said electric signal of said X-ray detector and inputting it to said second addressing line;

a data acquisition system acquiring said electric signals outputted from said second data line to convert them to digital data;

arithmetic processing means performing arithmetic processing said digital data; and

an image display unit displaying the result of said arithmetic processing.

5 6. The X-ray CT apparatus according to claim 5, wherein said data acquisition system has data correcting means correcting said analog electric signal from said photo-electric means corresponding to part or all of said X-ray detecting elements, or said digital data obtained by converting said analog electric signal.

10 7. An X-ray imaging system comprising:
an X-ray tube generating an X-ray;
one or more X-ray detectors according to any one of claims 1 to 4 located opposite said X-ray tube;
a detector control circuit producing a control signal for addressing said photo-electric means reading
15 out said electric signal of said X-ray detector and inputting it to a second addressing line;
a data acquisition system acquiring said electric signals outputted from said second data line to convert them to digital data; and
20 an image display unit displaying said digital data.

8. The X-ray imaging system according to claim 7, wherein said data acquisition system has data correcting means correcting said analog electric signal
25 from said photo-electric means corresponding to part or all of said X-ray detecting elements of said X-ray detector, or said digital data obtained by converting said analog electric signal.